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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/520,915 | 01/07/2005 | Satoshi Mizutani | 3712174.00491 | 5221 |

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| EXAMINER | |
|---|---|
| CHUO, TONY SHENG HSIANG | |
| **ART UNIT** | **PAPER NUMBER** |
| 1795 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 05/20/2010 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

chicago.patents@klgates.com

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/520,915 | MIZUTANI ET AL. | |
| | Examiner | Art Unit | |
| | Tony Chuo | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 April 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *41,44,45,47-63,66,67 and 69-86* is/are pending in the application.

4a) Of the above claim(s) *50-62 and 72-80* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *41,44,45,47-49,63,66,67,69-71 and 81-86* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/13/10 has been entered.

### *Response to Amendment*

2. Claims 41, 44, 45, 47-63, 66, 67, and 69-86 are currently pending. Claims 1-40, 42, 43, 46, 64, 65, and 68 are cancelled. Claims 50-62 and 72-80 are withdrawn from further consideration as being drawn to a non-elected invention. The amended claims do not overcome the previously stated double patenting and 103 rejections. Therefore, upon further consideration, claims 41, 44, 45, 47-49, 63, 66, 67, 69-71, and 81-86 stand rejected under the following double patenting and 103 rejections.

### *Double Patenting*

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claim 63 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 10 and 16 of copending Application No. 11/267,641. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of claim 63 is fully anticipated by the claims of copending Application No. 11/267,641.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 41 and 63 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 9-11, 18, 19, 26, and 27 of copending Application No. 12/026,594. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of claims 41 and 63 is fully anticipated by the claims of copending Application No. 12/026,594.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 41, 49, 63, and 71 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 7, and 8 of copending Application No. 11/268,010. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of claims 41, 49, 63, and 71 is fully anticipated by the claims of copending Application No. 11/268,010.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. Claim 63 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4, 7, 9, and 10 of U.S. Patent No. 7718311. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of claim 63 is fully anticipated by the claims of copending Application No. 11/267,116.

8. Claims 41 and 63 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 10-12 of copending Application No. 11/225,540. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter of claims 41, 42, 63, and 64 is fully anticipated by the claims of copending Application No. 11/225,540.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### *Claim Rejections - 35 USC § 103*

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 41, 49, 63, 71, 81, 82, 84, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (US 6203944).

The Turner reference discloses a battery comprising: a cathode, an anode, and an electrolyte, wherein the anode mixture layer comprises 86 wt% anode material having a reaction phase containing tin (element capable of generating an intermetallic compound with lithium), iron, and graphite (carbon), wherein specific examples of the anode material include 6 wt% carbon and 7.2 wt% carbon; and 8 wt% carbon black (carbonaceous material capable of inserting and extracting lithium) (See column 1, lines 64-67, column 6, lines 28-45, column 16, line 29-34, and Examples 17 and 19). It also discloses crystal sizes of less than about 500 angstrom (0.05 μm) (See column 5, lines 7-11).

However, Turner et al does not expressly teach a ratio of carbon in the reaction phase that ranges from about 10% by weight to about 40% by weight.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Turner anode to include a ratio of carbon in the reaction phase that ranges from about 10% by weight to about 40% by weight because even if the range of prior art and the claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties (*In re Woodruff* 16 USPQ 2d 1934 (Fed. Cir. 1990)). It is the position of the examiner that 7.2 wt% carbon is close enough to 10 wt% carbon that one of ordinary skill in the art would not expect a difference in properties. In addition, there is no evidence of the criticality of the claimed range of carbon ratio in the reaction phase. Further, it is the position of the examiner that the property "A peak of carbon that is obtained in a region lower than about 284.5 eV by x-ray photoelectron spectroscopy" is an inherent property of the Turner anode material because Turner et al discloses an anode material with a similar composition as the anode material recited in claims 41 and 63 of the present invention.

11. Claims 41, 45, 47-49, 63, 67, 69-71, 81, 82, 84, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohno et al (US 6495291) in view of Kawakami et al (JP 2000-311681).

The Kohno reference discloses a non-aqueous secondary battery comprising a positive electrode (cathode), a negative electrode (anode), and a non-aqueous electrolyte, wherein the negative electrode comprises 70 to 95% by weight of negative electrode active material and 0 to 25% by weight of a conductive agent such as acetylene black, carbon black and graphite, wherein the negative electrode active

material comprises a composition that is $M1_xM2_yC_{1-x-y}$, wherein x and y are atomic ratios, wherein M1 is at least one element selected from the group consisting of Si, Ge, Sn, Pb, B, Al, Ga, In, Sb, and Zn, wherein M2 is at least one element selected from Mg, Ca, Sr, Ba, Ti, Zr, V, Ta, Cr, Mo, and W, wherein an example of the negative electrode active material shown in Table 1 is $Sn_{0.25}Mg_{0.03}C_{0.72}$ which corresponds to 22.1 wt% carbon when the atomic ratios are converted to weight percent (See column 4 line 18 to column 5 line 3, column 9, lines 11-22, and Table 1, Example 1). It also discloses that the particle diameter of the composite material that is within a range of between 0.1 μm and 50 μm (See column 8, lines 27-29). It also discloses an average size of the crystal phase that is within a range of between 0.03 μm and 8 μm (See column 6, lines 37-40). Examiner's note: Ti, Zr, V, Ta, Cr, Mo, and W are elements from Group 4 to Group 6 in a long period periodic table. It is inherent that anode material particles with a particle diameter within a range of between 0.1 μm and 50 μm has a specific surface area of the anode material that ranges from about 0.05 $m^2/g$ to about 70 $m^2/g$.

However, Kohno et al does not expressly teach a reaction phase that contains at least one constituent selected from the group consisting of nickel, copper, iron, cobalt, manganese, zinc, indium, and silver. The Kawakami reference discloses a negative electrode material for a lithium secondary battery containing particles having a composition expressed by formula Sn.A.X, wherein A is at least one kind of transition metal chosen from Cr, Mn, Fe, Co, Ni, Cu, Mo, Tc, Ru, Rh, Pd, Ag, Ir, Pt, Au, Ti, V, Y, Sc, Zr, Nb, Hf, Ta, and W, wherein X is at least one kind selected from a group comprising O, F, N, Mg, Ba, Sr, Ca, La, Ce, Si, Ge, C, P, B, Bi, Sb, Al, In, S, Se, Te,

and Zn, wherein examples of the negative electrode material are Sn-Ni-C, Sn-Fe-C, Sn-Cu-C, Sn-Co-C, Sn-Fe-Ni-C (See Abstract and paragraphs [0033],[0099]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kohno negative electrode active material by substituting the elements of M2 for at least one constituent selected from the group consisting of nickel, copper, iron, cobalt, manganese, zinc, indium, and silver in order to utilize elements that provide an electrode structural body capable of contributing to a lithium secondary battery having a long cycle life, high capacity, and high energy density (See Abstract). In addition, the substitution of one known M2 element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

12. Claims 44 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohno et al (US 6495291) in view of Kawakami et al (JP 2000-311681) as applied to claims 41 and 63 above. In addition, Kawakami also discloses a negative electrode material that contains an alloy of tin, cobalt, carbon, and a fourth element (See Table 11, sample no. 20). It also discloses an element X of the alloy that is at least one kind selected from O, F, N, Mg, Ba, Sr, Ca, La, Ce, Si, Ge, C, P, B, Bi, Sb, Al, In, S, Se, Te, and Zn (See Abstract).

However, Kohno et al as modified by Kawakami et al does expressly teach a reaction phase that contains at least one selected from the group consisting of zinc, indium, and silver.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try to form an alloy from a finite number of identified alloying elements that are used in anode active materials with a reasonable expectation of success such as long cycle life, high capacity, and high energy density.

13. Claims 83 and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohno et al (US 6495291) in view of Kawakami et al (JP 2000-311681) as applied to claims 41 and 63 above.

However, Kohno et al as modified by Kawakami et al does expressly teach a carbonaceous material capable of inserting and extracting lithium in about equal ratio with the anode material.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kohno/Kawakami negative electrode to include a carbonaceous material capable of inserting and extracting lithium in about equal ratio with the anode material because changes in proportions was held to be obvious (*In re Fields* 134 USPQ 242 (CCPA 1962); *In re Reese* 129 USPQ 402 (CCPA 1961)). In addition, there is no evidence of criticality of the ratio of carbonaceous material to anode material.

### ***Response to Arguments***

14. Applicant's arguments filed 4/13/10 have been fully considered but they are not persuasive.

The applicants argue that Turner fails to disclose or suggest an anode material having a reaction phase containing carbon as recited, in part, by independent Claims 41 and 63. However, the portions of Turner relied on by the Patent Office merely disclose samples containing a mixture of two distinct phases: a $Sn_2Fe$ phase and a $SnFe_3C$ phase. Nowhere does Turner teach or suggest that the reaction phase of its anode active material is the $SnFe_3C$ phase containing carbon. To the contrary, Turner teaches that the $Sn_2Fe$ phase is the phase which reacts with lithium during cycling. One of ordinary skill in the art would thus understand that Turner merely discloses a reaction phase containing $Sn_2Fe$ and a separate, non-reactive phase containing carbon. As such, Turner fails to teach or suggest an anode material having a reaction phase containing carbon as required, in part, by the present claims.

In response, there is no teaching in Turner that the $SnFe_3C$ phase is a non-reactive phase containing carbon. Since Turner et al discloses an anode material comprising the same elements: Sn, Fe, and C formed by the same process as the present invention, the examiner maintains the contention that the $SnFe_3C$ phase is a reaction phase.

The applicants further argue that Turner fails to disclose or suggest an anode material wherein a peak of carbon is obtained in a region lower than about 284.5 eV by X-ray photoelectron spectroscopy. Furthermore, one skilled in the art would understand that the claimed property depends not only on the composition of the anode material but how it is formed. The anode active material of the present claims having the claimed peak of carbon may be formed, for example, by mechanical alloying of the carbon with

the other claimed elements. One skilled in the art would understand that mechanical alloying involves two steps: ball milling and sintering and applying hot isostatic pressure to fuse the elements together. See, Wikipedia, "Mechanical alloying," Nowhere does Turner teach fusing the elements together by sintering and applying hot isostatic pressure after ball milling. As such, one skilled in the art would understand that Turner fails to disclose or suggest, either expressly or inherently, an anode material wherein a peak of carbon is obtained in a region lower than about 284.5 eV by X-ray photoelectron spectroscopy in accordance with the present claims.

In response, the examiner would like to first point out that the specification of the present invention does not describe mechanical alloying as involving the steps of ball milling, sintering, and applying hot isostatic pressure. Secondly, the examiner disagrees that one skilled in the art would understand that mechanical alloying necessarily involves sintering and applying hot isostatic pressure after ball milling. Thirdly, the specification of the present invention discloses that “The anode material … can be manufactured by a method other than mechanical alloying method, for example, a melting method such as atomization method and roll method”. Therefore, mechanical alloying is not the only method of making the anode material. The Turner reference discloses in Example 19, a ball milled powder that was prepared according to the procedure of Example 8 which is a melting method by melting together stoichiometric ratios of tin and iron. Since the Turner reference discloses the same melting method for preparing the anode material as the present invention, the examiner maintains the

contention that a peak of carbon obtained in a region lower than about 284.5 eV by X-ray photoelectron spectroscopy is an inherent property of the Turner anode material.

The applicants further argue that even if combinable, the combination of Kohno and Kawakami fails to disclose or suggest an anode material having a reaction phase containing carbon, tin and at least one constituent selected from the group consisting of nickel, copper, iron (Fe), cobalt, manganese, zinc, indium, and silver as recited, in part, by independent Claims 41 and 63. Nowhere does Kohno suggest that the elements M1, M2 and C are all contained in a single reaction phase. Instead, Kohno teaches that its negative electrode active material contains two distinct phases, one containing carbon and the other containing elements M1 and M2.

In response, the examiner would like to point out that Kohno et al also discloses that "it is possible for the carbon-containing phase to contain the elements or atoms constituting the crystal phase in addition to carbon" (See column 7, lines 10-12). In addition, Kohno et al also disclose the same mechanical processing method using a planetary ball mill (column 7, lines 61-67) as disclosed in the specification of the present invention. Therefore, the examiner maintains the contention that the elements M1, M2, and C are all necessarily contained in a single reaction phase such that a peak of carbon is obtained in a region lower than about 284.5 eV by x-ray photoelectron spectroscopy.

Regarding the arguments for the obviousness-type double patenting rejections, the examiner maintains that the present claims are fully anticipated by the claims of the

copending applications even though additional limitations are recited in the claims of the copending applications.

## *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Michener can be reached on (571) 272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795